Rationale for Control of Anthropogenic Nitrogen and Phosphorus to Reduce Eutrophication of Inland Waters

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ABSTRACT: Concentrations of phosphorus and nitrogen in surface waters are being regulated in the United States and European Union. Human activity has raised the concentrations of these nutrients, leading to eutrophication of inland waters, which causes nuisance growth of algae and other aquatic plants. Control of phosphorus often has had the highest priority because of its presumed leading role in limiting development of aquatic plant biomass. Experimental evidence shows, however, that nitrogen is equally likely to limit growth of algae and aquatic plants in inland waters, and that additions of both nutrients cause substantially more algal growth than either added alone. A dual control strategy for N and P will reduce transport of anthropogenic nitrogen through drainage networks to aquatic ecosystems that may be nitrogen limited. Control of total phosphorus in effluents is feasible and is increasingly being required by regulations. The control strategy for nitrogen in effluents is more difficult, but could be made more feasible by recognition that a substantial portion of dissolved organic nitrogen is not bioavailable; regulation should focus on bioavailable N (nitrate, ammonium, and some dissolved organic nitrogen) rather than total N. Regulation of both N and P also is essential for nonpoint sources.

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